impossible to attain the necessary working temperature in the furnace.

A furnace is a very delicate mechanism, which cannot be successfully constructed unless the two following conditions are successfully met:

1. The mixture of the air and the combustible gas must be thorough;

2. The size of the combustion chamber must be such that the jet of flame may form in the fore part of the heating chamber.

In addition, as the working temperature of the furnace is very nearly equal to the instantaneous calorific intensity computed for the fuel, the time during which the hot gases remain in the heating chamber is less than one second; the supplying of flaming hot gases to the heating chamber and the withdrawal of the waste gases must be accomplished with uniformity.

From the foregoing it is evident that the art of proportioning these furnaces is, above all, a question of combustion, and that this must be completed before the gases reach the rear of the heating chamber. It will be necessary to take up and analyze this question in order that the direction to be given the current of hot gases may be fixed.

In one of the preceding sections mention was made of the conditions under which combustion may be best effected. In postponing the examination of these conditions the author remarked that, for the better mixture of the combustible gases with the eomburent, resource was had to a strangulation of the opening over the bridge wall, just as a kerosene lamp is prevented from smoking by the contraction of the chimney.

The only result of this contraction in the opening over the bridge wall is that of increasing the velocity of the hot gases passing that point. On account of this lowering of the roofs, these gases, after passing into the heating chamber, are slowed

down and fill the chamber over the hearth, from which they are drawn off through the waste-gas or chimney port. This shows why it is necessary to place the waste-gas or chimney port at the level of the hearth of the furnace, and exposes the error in the construction of those furnaces which have an updraft and from i| which the waste gases pass away at the highest point.

Practice completely confirms these deductions; in all reheating furnaces the waste gases should be carried away from the heating